

REMARKS

Claims 1-5, 7, 9-13, 15, 17, 18 and 20 remain pending in the application. Claims 6, 8, 14, 16 and 19 were previously cancelled. No claims are currently amended. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

1. REJECTION UNDER 35 U.S.C. § 103 – GENC, EDLUND & PETTIT

Claims 1-5, 7, 9, 11-13, 15, 18 and 20 stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Genc (U.S. Pub. No. 2002/0160245) in view of Edlund (U.S. Pub. No. 2002/0114984 and Pettit (U.S. Pub. No. 2005/0058861). This rejection is respectfully traversed.

The present claims are not obvious over Genc, Edlund, and Pettit as combination of these documents fails to provide for all of the claimed features as arranged in the claim and there is no apparent reason for a skilled artisan to modify the combination to include the missing subject matter. In particular, the combination of documents does not disclose a first passive hydrogen vent that maintains the hydrogen concentration below about 4% without reliance on any electrical device or other active components to function. Moreover, there is no basis in the cited documents to adapt and modify the release valve of Genc with aspects of the active hydrogen detection and dilution system of Pettit and include a second enclosure with a second hydrogen vent.

Genc is concerned with operation of a fuel cell cooling system and gas trapped therein during startup/operation. Genc discloses a release valve 30 having a membrane 40 operable to permit passage of gas and inhibit passage of liquid at a first pressure. Genc paragraphs [0019]-

[0020] on pages 1-2; and Figure 2. Gases, mainly air, can be drawn into the cooling system from the outside due to negative pressure or during a coolant drain. Genc paragraph [0004]. Gas contained in the cooling system during startup and operation needs to be removed. Genc paragraph [0004]. Notably, Genc is silent with respect to hydrogen or a need to vent hydrogen and Genc's concerns with gas buildup are in relation only to operation of the cooling system. Indeed, "Genc is silent to maintaining the hydrogen concentration below 4 percent or below 1 percent" as stated by the Office Action dated March 23, 2010 at page 3, lines 3-4, because Genc does not contemplate venting hydrogen at all. The Pettit document, detailed below, is relied on for teaching that hydrogen is kept at less than 4 percent. However, as Genc is not directed to controlling hydrogen, there is no reason to modify Genc in this way.

The Office Action alleges that in Pettit "[t]he hydrogen concentration is kept below 4% and preferably 1% ([0032])." Office Action dated March 23, 2010 at page 3, line 12. However, this is not what Pettit says. Instead, Pettit paragraph [0032] speaks to the temperature rise of the catalytic combustion element and/or ventilation stream and how it varies with the percentage of hydrogen by volume. Pettit continues:

For example, when the hydrogen comprises approximately 4% by volume of ventilation stream 41, a temperature rise of over 300°C would occur and be readily detectable. Even at a greatly reduced hydrogen concentration of about 1% by volume of ventilation stream 41, a temperature rise of about 80°C would occur and also be readily detectable. Thus, the temperature detected by temperature sensing device 74 is related to the volumetric percent of hydrogen within ventilation stream 41 and can be used by the microprocessor to initiate different corrective actions. For example, depending upon the volumetric percentage of hydrogen within ventilation stream 41, as detected by the temperature rise, the microprocessor can initiate a warning signal, reduce the operational level of fuel cell stack 22, increase the quantity of oxidant 28 provided by compressor 54 to thereby increase the flow rate of ventilation stream 41, and/or cease operation of fuel cell system 20.

Pettit paragraph [0032]. Thus, there are no “hydrogen correction standards taught by Pettit” as alleged in the Office Action dated March 23, 2010 at page 3, line 14-15. And Pettit does not teach “that it is well known in the art to keep the hydrogen concentration below 4%.” Office Action dated March 23, 2010 at page 8, line 20-21. Accordingly, there is no disclosure in Pettit of maintaining the hydrogen concentration within a first enclosure below about 4 percent, as per the present claims. The cited portion of Pettit simply speaks to detection of temperature increases by temperature sensing device 74 at respective hydrogen concentrations and whether various corrective actions may be used; *e.g.*, initiate a warning signal, reduce the operational level of fuel cell stack 22, increase the quantity of oxidant 28 provided by compressor 54 to thereby increase the flow rate of ventilation stream 41, and/or cease operation of fuel cell system 20.

Pettit further discloses collecting and combusting hydrogen using electrical components and/or active components, such as a sensor (*e.g.*, hydrogen detector), controller, or fan to provide a ventilation stream. Pettit paragraphs [0005], [0006], and [0047]. A compressor 54 pressurizes cathode effluent stream 34 which flows through WVT 56 and forms a ventilation stream 41. Pettit paragraph [0029]. The ventilation stream 41 captures and dilutes hydrogen within enclosure 40 where it is directed through a catalytic combustion element 72 to a combustor 46, forming an exhaust stream 70. Pettit paragraph [0030]. Thus, the compressor 54 and pressure of the ventilation stream 41 are active ventilation features, which are inapposite to the presently claimed first passive hydrogen vent, which is configured to vent hydrogen from the first enclosure without reliance upon any electrical device or other active components to function. See also Pettit paragraph [0047]. Moreover, Pettit does not actually vent hydrogen but instead combusts the hydrogen, so Pettit does not provide a hydrogen vent. The exhaust stream 70

comes from combustor system 46, which removes the hydrogen provided by anode effluent stream 32. Pettit paragraph [0031]; and see FIG. 1. The “combustor system 46 [is] operable to consume the remaining hydrogen in anode effluent stream 32.” Pettit paragraph [0021]. Thus, no hydrogen is vented via the exhaust stream 70 and accordingly it is not a hydrogen vent.

The Edlund document discloses a housing 140 that encompasses a fuel cell system. Edlund paragraph [0062] pages 7-8; Figure 11. The housing 140 can be combined with an energy-consuming device 25 that can include a body 142, such as a motor vehicle. Edlund paragraph [0064]. Edlund does not teach a vent in the housing 140 or in the body 142 and is silent regarding the buildup of hydrogen or maintaining particular hydrogen concentrations in the housing 140 or body 142. And mere disclosure of the housing 140 and body 142 says nothing with respect to venting or vent placement or maintaining hydrogen below a particular percentage.

The Office Action dated March 23, 2010 at page 4, lines 1-6 alleges that one of ordinary skill in the art would modify the fuel cell system of Genc with the housing of Edlund and include a release valve (as per Genc) in the housing in order to prevent build up of hydrogen gas. However, viewing the straightforward combination of Genc, Pettit, and Edlund, there is no apparent reason for a skilled artisan to limit the hydrogen concentration, as per the present claims, based on these documents. Nowhere does Genc disclose venting hydrogen or suggest a need to vent hydrogen. In fact, it is unknown whether or not the Genc release valve is suitable for venting hydrogen. The Genc release valve may inherently function to vent hydrogen trapped within the coolant, but inherency cannot be a basis for an obviousness construction as obviousness cannot be predicated on what is unknown and unappreciated. See *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) (reversed rejection because inherency was based on what would result due to optimization of conditions, not what was necessarily

present in the prior art). Moreover, the combined documents provide no reason to include a second vent in a different structure anywhere for any purpose.

The only document in the cited combination concerned with hydrogen removal is Pettit and this document does not actually vent hydrogen but instead collects and combusts the hydrogen. At best, the Pettit active collection and combustion system might be combined with the release valve of Genc. But, when properly viewing these documents as whole for all that they disclose, there is no apparent reason for a skilled artisan to provide various release valves (as per Genc) in various enclosures (as per Edlund) to vent hydrogen to below about 4 percent. Only Pettit is concerned with removing hydrogen (via combustion) and does not disclose that the hydrogen is maintained below 4%; Pettit simply notes that hydrogen at 4% produces a particular temperature increase (300°C) detected by the temperature sensing device.

In addition, there is no reason for a skilled artisan to replace the active hydrogen collection and combustion system of Pettit with the Genc release valve as doing so would render aspects of Pettit inoperable. See *In re Ratti*, 270 F.2d 810, 123 U.S.P.Q. 349 (CCPA 1959) (If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious.). The whole benefit of the Pettit system is collection and combustion of hydrogen, which is defeated by replacing the system with release valves as per Genc.

What is more, the Genc release valve and the Pettit hydrogen detection and combustion system address separate functions within a fuel cell, and therefore no apparent reason exists for a skilled artisan to modify the Genc release valve to conform to the operation of the hydrogen combustion system of Pettit. The Genc and Pettit disclosures might work in concert, but there is

nothing to suggest Genc can be modified to perform the function of the system of Pettit. The only nexus for tying modification of the Genc release valve to operate akin to a hydrogen detection and dilution system as per Pettit is Applicants' own disclosure, which cannot serve as a predicate for obviousness.

Finally, there is nothing in Edlund to suggest putting any type of vent in both the housing 140 and the body 142, where these features are combined with Genc and Pettit. In fact, the hydrogen system of Pettit burns collected hydrogen, obviating any need to provide further passage of hydrogen gas through successive enclosures and include one or more additional hydrogen vents or release valves as per Genc. Hence, properly viewing each of the Genc, Pettit, and Edlund disclosures as a whole, there is no apparent reason for a skilled artisan to make the combination and modifications as alleged in the present rejection.

The combination of Genc, Edlund, and Pettit therefore cannot establish a case of obviousness. Reconsideration of the claims and withdrawal of the rejection are requested.

2. REJECTION UNDER 35 U.S.C. § 103 – GENC, EDLUND, PETTIT & BUZZELLI

Claims 10 and 17 stands rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Genc (U.S. Pub. No. 2002/0160245) in view of Edlund (U.S. Pub. No. 2002/0114984), Pettit (U.S. Pub. No. 2005/0058861) as applied to Claims 1 and 11 and further in view of Buzzelli (U.S. Pat. No. 4,168,349). This rejection is respectfully traversed.

The shortcomings of the Genc, Edlund, and Pettit combination are illustrated in the preceding section. Briefly, these documents do not disclose maintaining the hydrogen concentration below about 4 percent without reliance on any electrical device or other active components to function. Moreover, there is no basis in the cited documents to adapt and modify

the release valve of Genc with aspects of the active hydrogen system of Pettit. The release valve of Genc and the hydrogen system of Pettit are addressing different problems and function in different ways. Addition of Edlund also fails to tie Genc and Pettit together and further fails to provide any basis to include hydrogen vents in its enclosure and body or maintain hydrogen below about 4 percent.

Buzzelli is added to the combination for disclosing an iron/air battery cell having a sintered ceramic vent that acts as a flame and explosion barrier. Buzzelli col. 2, lines 55-60. However, the Buzzelli document fails to overcome the deficiencies of the Genc, Edlund, and Pettit combination. Namely, the collection of these four documents does not provide for a passive hydrogen vent that maintains the hydrogen concentration below about 4% without reliance on any electrical device or other active components to function. And there is no identifiable reason to modify the Genc release valve to conform with aspects of the hydrogen system of Pettit as these features are performing different functions. The combination also does not disclose actually venting hydrogen (hydrogen is instead combusted by the cited art) and providing a passive vent in the Pettit apparatus would serve to contravene operation of the Pettit apparatus, an action the collective documents provide no reason to take. Claims 10 and 17 are therefore patentable.

Reconsideration of the claims and withdrawal of the rejection are requested.

3. REJECTION UNDER 35 U.S.C. § 103 – HOBMEYR & PETTIT

Claims 1-5, 7, 11-13, 15 and 18 stands rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Hobmeyr (U.S. Pub. No. 2005/0106438) in view of Pettit (U.S. Pub. No. 2005/0058861). This rejection is respectfully traversed.

The present claims are not obvious over Hobmeyr in view of Pettit as these documents do not provide all of the claimed features as arranged in the claim and there is no apparent reason for a skilled artisan to modify the combination to include the missing subject matter. In particular, the combination does not disclose maintaining the hydrogen concentration below about 4% without reliance on any electrical device or other active components to function. Moreover, there is no basis in the cited documents to adapt and modify the hydrogen-permeable conduit of Hobmeyr with aspects of the active hydrogen system of Pettit without including Pettit's active compressor ventilation stream and combustor.

Hobmeyr discloses a fuel cell system with a cooling fluid flowing through a hydrogen-permeable conduit (HPC). Hobmeyr abstract. Hydrogen within the cooling fluid permeates through the HPC to reduce the hydrogen content of the cooling fluid. Hobmeyr paragraph [0005]. The HPC increases the hydrogen-content of the atmosphere immediately surrounding it as a result of the hydrogen permeation, so the HPC is preferably located in an area having air flow. Hobmeyr paragraph [0021]. "Hobmeyr is silent to a second enclosure and keeping the level of hydrogen below 4 percent or below 1 percent." Office Action dated March 23, 2010 at page 5, lines 14-15. As Hobmeyr is silent with respect to a second enclosure, it is also silent with respect to a second hydrogen vent.

Aspects of the Pettit document are described above. Of particular note, there is no disclosure in Pettit of maintaining the hydrogen concentration within a first enclosure below about 4 percent, as per the present claims. And Pettit does not actually vent hydrogen, as hydrogen is instead combusted, meaning there is no hydrogen vent in Pettit.

A straightforward combination of Hobmeyr and Pettit includes a fuel cell employing the HPC of Hobmeyr with the hydrogen detection and dilution system of Pettit. The HPC could

release hydrogen where the ventilation stream powered by the compressor could collect and direct the hydrogen for combustion, as provided by Pettit. However, neither document provides a basis for maintaining the hydrogen concentration within a first enclosure below about 4 percent. In addition, there is no mention anywhere in Hobmeyr or Pettit of using two enclosures each having a hydrogen vent. As described above, the alleged "hydrogen vent" of Pettit is not a vent; the hydrogen is instead combusted so that no hydrogen is actually vented. Thus, the Office Action dated March 23, 2010 at page 9, line 12 is incorrect when stating that "Pettit teaches a second enclosure with a hydrogen vent."

As such, the present claims are not obvious. Reconsideration of the claims and withdrawal of the rejection are requested.

4. REJECTION UNDER 35 U.S.C. § 103 – HOBMEYR, PETTIT & EDLUND

Claims 9 and 20 stands rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Hobmeyr (U.S. Pub. No. 2005/0106438) in view of Pettit (U.S. Pub. No. 2005/0058861) as applied to Claims 1 and 11 and further in view of Edlund (U.S. Pub. No. 2002/0114984). This rejection is respectfully traversed.

Claims 9 and 10 are not obvious in view of Hobmeyr, Pettit, and Edlund as these documents do not disclose a first passive hydrogen vent that maintains the hydrogen concentration below about 4% without reliance on any electrical device or other active components to function. Moreover, Pettit does not actually vent hydrogen, as hydrogen is instead combusted, meaning there is not a hydrogen vent in Pettit.

The Hobmeyr and Pettit documents are described above.

Addition of Edlund to the Hobmeyr and Pettit combination fails to cure the previously

noted defects. Edlund provides a housing 140 that encompasses a fuel cell system. Edlund paragraph [0062] pages 7-8; Figure 11. The housing 140 can be combined with an energy-consuming device 25 that can include a body 142, such as a motor vehicle. Edlund paragraph [0064]. Edlund does not teach maintaining hydrogen concentration below about 4%, does not teach a vent in the housing 140 or in the body 142, and is silent regarding the buildup of hydrogen. There is nothing in Edlund to suggest putting any type of vent in both the housing 140 and the body 142. In fact, the hydrogen detection and dilution system of Pettit burns collected hydrogen, obviating any need to provide further passage of hydrogen gas and including an additional hydrogen vent.

Hence, properly viewing each of the Hobmeyr, Pettit, and Edlund disclosures as a whole, there is no apparent reason for a skilled artisan to make the alleged combination and modifications. Reconsideration of the claims and withdrawal of the rejection are requested.

5. REJECTION UNDER 35 U.S.C. § 103 – HOBMEYR, PETTIT & BUZZELLI

Claims 10 and 17 stands rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Hobmeyr (U.S. Pub. No. 2005/0106438) in view of Pettit (U.S. Pub. No. 2005/0058861) as applied to Claims 1 and 11 and further in view of Buzzelli (U.S. Pat. No. 4,168,349). This rejection is respectfully traversed.

Claims 10 and 17 are not obvious over Hobmeyr, Pettit, and Buzzelli as the document combination fails to disclose maintaining the hydrogen concentration below about 4% without reliance on any electrical device or other active components to function. Moreover, Pettit does not actually vent hydrogen, as hydrogen is instead combusted, meaning there is not a hydrogen vent in Pettit.

Buzzelli discloses an iron/air battery cell having a sintered ceramic vent that acts as a flame and explosion barrier. However, the Buzzelli document fails to overcome the deficiencies of Hobmeyr and Pettit. Namely, the combination of documents does not provide for a passive hydrogen vent that maintains the hydrogen concentration below about 4% without reliance on any electrical device or other active components to function. And there is no reason to use the Buzzelli vent versus the hydrogen collection and combustion system of Pettit.

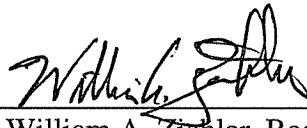
Reconsideration of the claims and withdrawal of the rejection are requested.

6. CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

Dated: April 19, 2010

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